

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

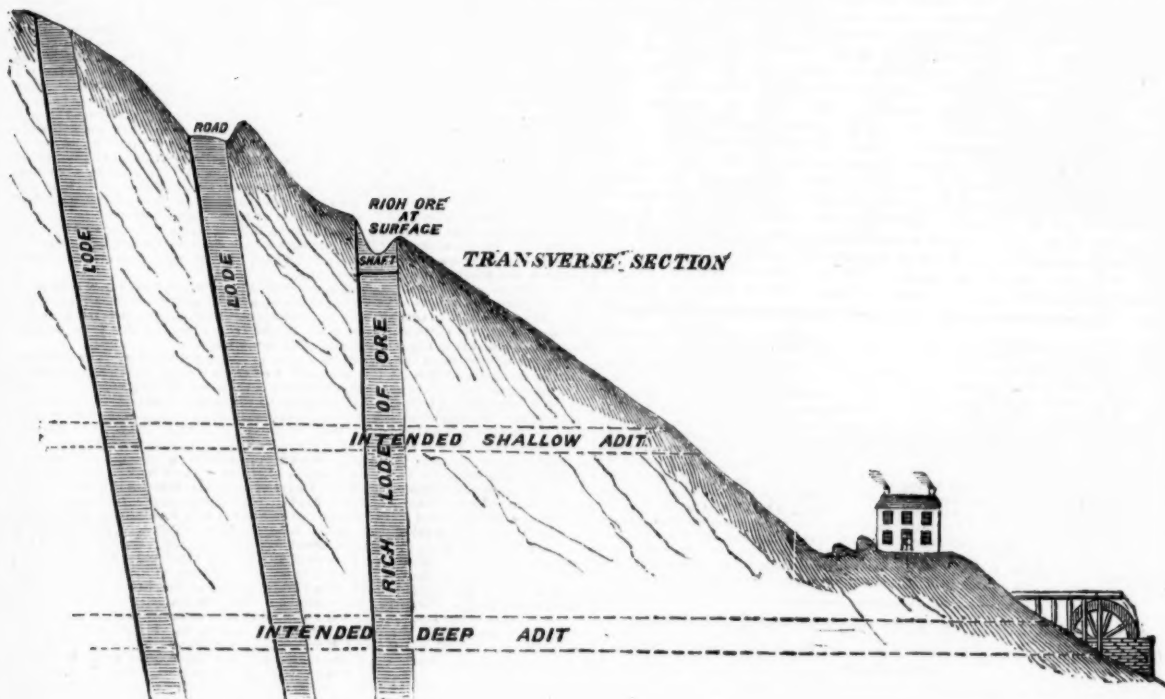
FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1365.—VOL. XXXI.]

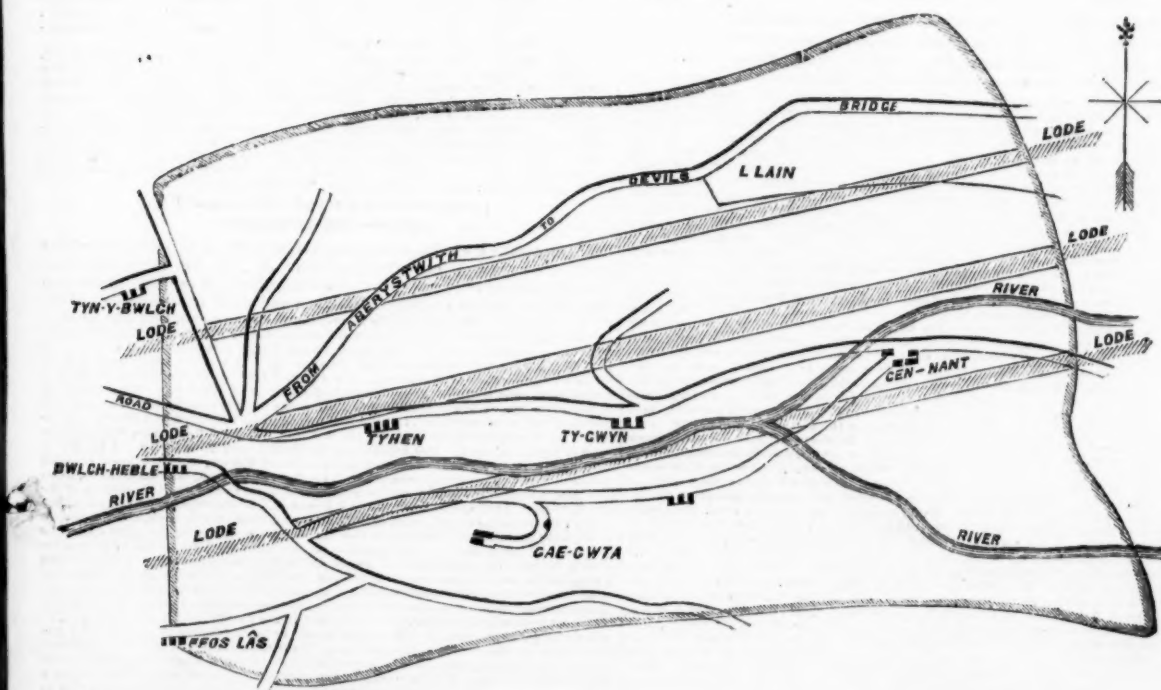
LONDON, SATURDAY, OCTOBER 19, 1861.

[WITH STAMPED... SIXPENCE.
JOURNAL UNSTAMPED, FIVEPENCE.]

THE WEST SILVER BANK MINE, LLANFIHANGELY-CREIDDYN, CARDIGANSHIRE.



SURFACE PLAN.



We have pleasure in publishing this week some particulars of a mine in the great and interesting silver-lead district of Cardiganshire. This great lead district has been favourably known to the mining community for centuries, and at least one Sovereign established a mint at Aberystwith for the coinage of its silver; but this is only a very modern portion of its history, which extends back for twenty centuries, and one of the mines, Cwm-y-stwith, has not sensibly changed its name since it was mentioned by Pliny, the Roman historian, as a lead-producing mine of his day, and this continues still one of the most productive Cardiganshire mines of our own. The lodes of this county are of great thickness, ranging from a few feet up to 100 feet in width, and having rich divisions of ore for several feet wide. As is usually the case, Nature in depositing her stores for man has not, when the ores are highly silverised, placed them in such solid masses as where the galena is less charged with silver; so that by a wise method of equipoise there are on an average as large fortunes made from the common lead as from the silver-lead mines. One of the veins of this county, the Llanfair Clydogan lode, produces an ore which contains as much as 80 ozs. of silver to the ton; about the Goginan district the veins average from 20 to 40 ozs. of silver to the ton, and Goginan Mine itself has yielded as much as from 2 to 3 tons of pure silver per annum, the lead giving about

30 ozs. of silver to the ton. There is also a compensating principle about the size of the lodes: when the lodes are smaller, say from 2 to 6 ft. wide, the lead is usually more solid and less expensive to work than when the veins are larger, and the lead more scattered or divided by unproductive screens of rock. The rock of the country in which the lead veins are embedded is the Cambrian slates, a series of beds of great thickness, ten times deeper than the deepest mine in Cornwall, which, taking the sea as a level, is the deepest point, say 600 yards, that man has yet penetrated into the crust of the earth perpendicularly; and we may reasonably suppose, as perhaps only one or two mines in Cardiganshire have yet reached a depth equal to the level of the sea, that these mines will not be worked out or exhausted for a number of centuries, supposing it to be in the power of man to accomplish such a work. The veins, unlike some of the great British mining districts, are in this district principally wrought by the means of water-power, a sufficient quantity of which is caught to the west of the great Plynlimmon range of mountains to supply all the machinery used for mining below their lofty crests, which rise to a height of 2400 ft. above the level of the sea, and the mines are found in the sides of the mountain ridges, rising in steps from the sea board to the top of Plynlimmon.

The particular mine, of which we have given a plan and transverse section in our present Number, and to which we are about to call attention,

is situated on the Aberystwith and Devil's Bridge-road, three miles from the Bridge and eight miles from Aberystwith: at this spot the road overlooks the bed of the Rheidol, which forms a charming landscape below, in which is conspicuous Glen Rheidol, a seat built by a descendant of Sir T. Bonsall, the celebrated miner, from 900 to 1000 ft. deeper than the site of the mine. The River Rheidol flows through this fine landscape, and, as its name indicates, it presents a series of fordable passes and grand waterfalls, the whole forming as sublime a sight as can be imagined. It is pardonable to dwell upon the scenery of this delightful neighbourhood, as many mining districts are barren and uninviting, and afford no joy to the tourist, whatever they may do to the smelter. At the Devil's Bridge, three miles from the mine, the River Mynach tumbles down over a face of rock 400 ft. into the River Rheidol, and this is one of the grandest and most marvellous of the tourist stations in South Wales; also the wonderful grounds of Hafod lie in close proximity, but we must go on with our mining notice.

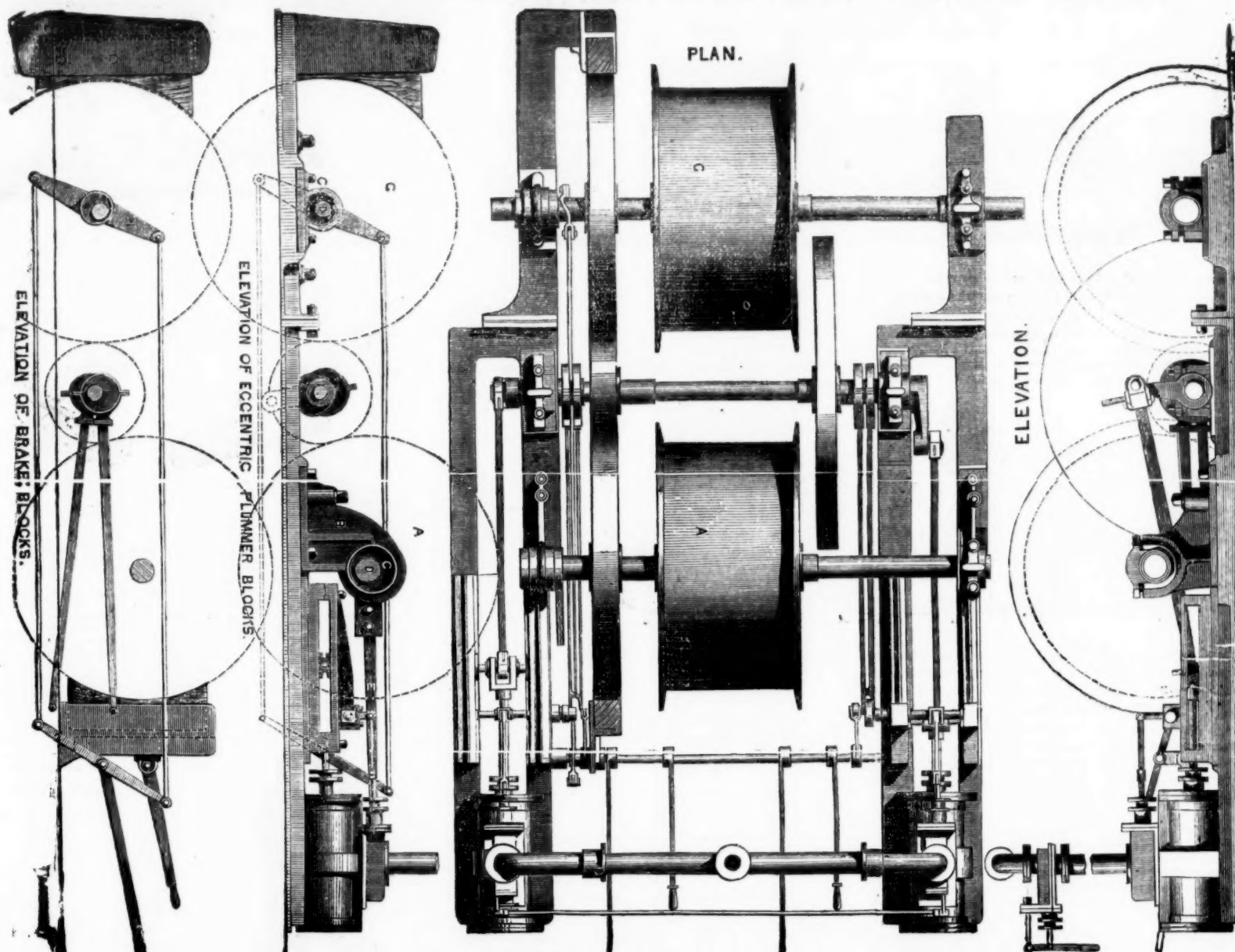
The West Silver Bank Mine has only been taken as a mining grant from Colonel Powell a few weeks, and scarcely a pick had been struck into it before a rich course of ore was discovered at the very grass. The whole of the side of the hill, forming the south bank of the Rheidol to the eastward, has by the Romans been worked into a series of escarpments and drifts in every direction, showing that in those remote times they must have had one of their greatest mines there. These old mining works, upon the backs of a range of lodes, traced their courses for a mile, almost down to the boundary of the West Silver Bank sett; and, on trying for the lodes just along the line, one of them was discovered full of lead, only a few feet below the turnpike-road; possibly had it existed in a less exposed place it would have been sooner discovered. The ore in this vein is of excellent quality, very massive and solid, and yielding from 2 to 3 tons per fathom. The deepest point yet reached is 6 yards, where the lode is quite regular, between well-defined walls, with every likelihood of going down uninterrupted, and forming a great mine, as the metal in this upper portion of the lode is so abundant that it yields 30l. worth of ore to the fathom. The facilities for working this mine are remarkably great, as a cross adit from the brook dividing this ground from the Silver Bank Mountain, driven into the hill south for 120 fms., will drain and open the lode with nearly 50 fms. of backs. It is difficult to say what quantity of ore may be unwatered by this adit; but if the lode continues to yield as it does now at the surface for a length of 100 fms., by 50 fms. high, at 20l. per fm., it would give 100,000l. worth of ore above the adit, and this is but a comparatively small amount, when measured by the yield of the back of the Goginan adit, and the adits of some other mines in the neighbourhood. If this be so, and there is every reason to conclude that it is, this piece of ore ground ought to yield a profit of 25,000l., without sinking an inch lower than the adit. There is also a fair stream of water flowing at the proposed adit's mouth for dressing, and doing the ordinary work of the mine, by means of high and narrow wheels, for which there is an abundance of fall. It is now decided to divide this mine into 6000 shares, of 3l. each, 2500 of which will be devoted to payment for the mine and its rich discoveries, and the remainder to find capital to work it effectually. Now, it will be wise to come to some practical conclusion as to the value of these shares; there is 1l. per share to be called up as the first instalment, and most likely that will be all the capital that will be required. If so, every holder of a share on which 1l. is paid will find it immediately to be worth 10l.; or, in other words, it will be obtaining 10l. worth of property for 1l., because the capital is only required for the machinery for sinking and pumping. Every fathom of ground yielding 30l. worth of ore will leave a large profit as it is broken, and the amount of capital wanted is only a trifling sum; so that such an opportunity of procuring a valuable property at a merely nominal outlay but rarely occurs. The narratives of the profits in mining in this district upon trivial outlays are almost beyond belief. People hesitate to credit facts when the result so much outweighs the cause. For example, the Goginan Mine, the sister mine to West Silver Bank, was opened for the small sum of 500l., and yielded the third year a profit of 8400l., after supplying the mine from the ore money with 10,000l. worth of machinery. The shares were 1l., and soon after being issued they reached the great value of 420l. per share, for which sum they were commonly sold on the market. Each 5l. share carried dividends of 80l. to 100l. a year for many years, and the mine, after 20 years' working, is a large and productive one. Immediately to the south of the West Silver Bank, after 30 years' working, there are mines now yielding greater profits than they ever yielded, although their profits have been enormous. Seeing that this district yields such large dividends for small outlays, and that the mines are amongst the most lasting in the kingdom; that no branch of commerce or industry yields a title of the income derived from the capital employed in some of these mines, and that where there is anything like good management there is seldom or never a failure of obtaining success; and that in this mine there is a great discovery to begin with—we fancy we should be failing in our duty to the public if we did not call attention to it. It is no part of our duty to provide speculations for the public, but if we see an opportunity, presenting great and substantial advantages, we esteem it both a pleasure and a duty to advert to it. We wish the West Silver Bank Company every legitimate success it is entitled to; and we predict that in a very short time this will become a very rich property, and that the fortunate holders will be obliged to us for pointing it out as an investment worthy of their attention. The samples are excellent—there can be no concealment about the thing. The lode is exposed full of lead ore to the surface, and every person before he becomes connected with the property may go down and see the ore ground exposed in the open daylight for himself.

COAL MINES LIGHTED BY ELECTRICITY.—Dr. John Taylor, Glasgow, in some remarks on "Fire-Damp in Coal Mines," addressed to the Philosophical Society of that city, suggests the employment of hermetically sealed vacuum tubes, which can now be steadily illuminated by means of the induction current from the Ruhmkorff coil and similar apparatus. These luminous tubes could be suspended in the centre of the chamber, and if accidentally broken no harm would ensue but the extinction of the light, as the brush from the exposed end of the wire of the voltaic battery would not ignite a gaseous mixture. The battery could be kept in a distant part of the downcast passage, where no danger of explosion could occur; and all that would be required would be the renewal of the exciting liquids. Dr. Taylor also figures and describes an apparatus devised for constantly indicating the proportion of fire-damp in the atmosphere of coal mines, and for giving alarm when the quantity approaches the explosion point.

A detailed black and white illustration of a mechanical device, likely a water-powered clock or automaton. The device is constructed from wood and features a complex system of gears, levers, and a large wheel on the right side. It is mounted on a base and appears to be part of a larger structure, possibly a stage or a public display. The illustration shows the intricate mechanical components and the overall structure of the device.

ELECTRIC TELEGRAPH CONDUCTOR.—As a substitute for the ordinary conducting wire used for telegraphic purposes, Mr. A. Parkes of Birmingham, proposes a wire formed of tubes placed one within another, and with a solid rod centre, drawn down to the necessary size. Sometimes he uses silver to increase the conducting power. In such cases he places a tube or rod of silver within a tube of copper, or he introduces several tubes or rods of silver into an outer tube or tubes of copper, or copper and silver may alternate. These are drawn down to the required size. As the object is to obtain silver with copper, the silver may be deposited by the electrolytic process upon the copper, and the several tubes or rods then arranged in any suitable manner ready for drawing or rolling down to the required size.

COLLIERY WORKING—HIGH-PRESSURE COUPLED WINDING ENGINES.



The illustrations represent a pair of high-pressure coupled winding engines working at Drumroo Colliery, near Edinburgh, and recently erected by the Frictional Gearing Company, from designs by Mr. Ralph Moore, mining engineer, Glasgow. The cylinders are horizontal, 16 in. diameter, 3 ft. stroke, fitted with link-valve motion; each engine rests on a cast-iron frame, and are attached, one at each end, to a crank-shaft, which, by means of Robertson's frictional gearing, drives two drums, on which wind two wire-ropes for working two inclines underground. The whole machinery rests on wooden logs, and is placed upon the surface; the wire-ropes are let down the pit, one to each incline. The engines draw the loaded trucks of coals up the incline planes. By the introduction of the frictional gearing this is effected with the greatest simplicity, as the wheels

have simply to be brought into contact to give sufficient grip to lift any weight that the engine is capable of, while they slip if any unlooked-for strain comes on; of course, whenever out of contact, the drum ceases to be acted upon. The empty trucks descend by their own gravity, and the drum is thrown out of gear for that purpose. By a very simple contrivance, also the invention of Mr. Robertson, either wheel when out of gear can be pressed against a block of wood, grooved the same as the wheel itself, which acts as a brake to regulate the speed of the descending empties. The travel of the shaft between, full in gear and full out, pressing against the brake, is only about three-eighths of an inch, which is effected by making the bush in the plummer-block nearest to the wheel in one piece, and of a circular form, to revolve in the plummer-block eccentric to the line of the shaft, so that, by shifting or turning round the bush in the plummer-block, the

shaft is shifted backwards or forwards, throwing the wheels in or out of contact, as desired. Levers are attached to these bushes, and brought convenient to the engineman. Plan No. 3 shows the action of the eccentric bush. The drum, A, is shown out of gear, B is the plummer-block, C the eccentric bush, D the shaft carrying the drum, A. By raising or depressing the lever, E, which is attached to the bush, C, the wheel is pressed forward into gear or back upon the brake-block, F. The drum, G, is similar in action, but, for convenience sake, there are double levers, H, for shifting. The drums can be shifted out or in with the greatest ease by a mere boy, and the machinery is capable of raising 250 tons a day. The inclines are each 500 yards in length, and the gradients 1 in 3 and 1 in 4. Load 2 tons, of which 21 cwt. is coals, exclusive of rope, which is 7 lbs. per fm. When completed, the inclines will be about 900 yds. long.

INVESTMENTS IN BRITISH MINES.—Mr. MURCHISON publishes a QUARTERLY REVIEW OF BRITISH MINING, giving at the same time the POSITION and PROSPECTS of the MINES at the end of each Quarter, the DIVIDENDS PAID, &c.; price One Shilling. RELIABLE INFORMATION and ADVICE will at any time be given by Mr. MURCHISON, either personally or by letter, at his Office, No. 117, BISHOPSGATE-STREET WITHIN, LONDON, where copies of the above publication can be obtained.

OPINIONS OF THE PRESS ON MR. MURCHISON'S WORK ON BRITISH MINING, PUBLISHED IN 1856.
Mr. Murchison's new work on British Mines is attracting a great deal of attention, and is considered a very useful publication, and calculated to considerably improve the position of home mine investments.—*Mining Journal*.

The book will be found extremely valuable.—*Observer*.
A valuable guide to investors.—*Herapath*.
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A valuable little book.—*Globe*.
Of special interest to persons having capital employed, or who may be desirous of investing in mines.—*Morning Chronicle*.
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Parties requiring information on mining investments will find no better and safer instructor than Mr. Murchison.—*Leeds Times*.
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This is really a practical work for the capitalist.—*Stockport Advertiser*.
This work enables the capitalist to invest on sound principles; in truth, it is an excellent guide.—*Plymouth Journal*.
All who have invested, or intend to invest, in mines, would do well to consult this very useful work.— *Ipswich Express*.

Persons desirous to invest their capital in mining speculations, will find this work a very useful guide.—*Warwick Advertiser*.
We believe a more useful publication, or one more to be depended on, cannot be found.—*Plymouth Herald*.

Those interested in mining affairs, or who are desirous of becoming speculators should obtain and carefully peruse the work.—*Monmouth Beacon*.
With such a work in print, it would be gross neglect in an investor not to consult it before laying out his capital.—*Poole Herald*.

Every person connected, or who thinks of connecting himself, with mining speculations should possess himself of this book.—*North Wales Chronicle*.
Mr. Murchison will be a safe and trustworthy guide, so far as British Mines are concerned.—*Bath Express*.
A very valuable book.—*Cornwall Gazette*.
All who have invested, or intend to invest, in mines should peruse this able work. It is deserving the attention of every one who seeks profitable investment of his capital.—*Brighton Examiner*.

It is full of carefully compiled and reliable information relative to all the known mines of the United Kingdom.—*Sheffield Free Press*.

THE MECHANICS' MAGAZINE, and Journal of Engineering, Agricultural Machinery, Manufactures, and Shipbuilding. Published weekly, price 4d.; by post, 5d. Office, 166, Fleet-street, London, E.C.

"The Mechanics' Magazine" has from its establishment had an extensive circulation, and it communicates, for 4d. per week, far more valuable information, both scientific and practical, than was ever before placed within the reach of even those who could afford to pay six times as much for it.—*LORD BROGHAM*.

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A Monthly Trade Circular. Entered at Stationers' Hall, and registered for transmission abroad. Office, 24, Bow-lane, London, E.C.
The *Ironmonger* is published on the last day of every month, and supplied to the trade only for the sum of 5s. per annum, post free. It contains Leading Articles, Mirror of the month, List of Contracts open, Extracts, Trade Reports, Price Currents and Statistics, Reports of Trade Meetings, &c., List of English and Foreign Patents, and Novelties (illustrated when necessary), Correspondence, Gazette, and other matters interesting to the trade, specially selected and arranged for its columns.
Manufacturers and wholesale houses will find this journal the best possible medium for bringing their articles before the trade, no expense being spared in its introduction at home and abroad, wherever the English language is spoken, and a permanent English and Foreign circulation of several thousands per month being guaranteed. Scale of charges for advertisements:—Page, 35s.; half page, 20s.; quarter page, 12s. 6d.; per word, 1d. Assistants' advertisements, not exceeding 24 words, will be inserted for 1s. each.

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J. U. BASTIER, sole manufacturer, will CONTRACT TO ERECT HIS PATENT PUMP AT HIS OWN EXPENSE, and will GUARANTEE IT FOR ONE YEAR, or will GRANT LICENSES to manufacturers, mining proprietors and others, for the USE of his INVENTION.
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Accumulated fund exceeds £500,000
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Annual income from life premiums, upwards of 220,000
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From Prof. De Morgan's report upon the last valuation of liabilities (end of 1858), and the statements of accounts, it appeared at that time that the surplus in favour of the Albert business alone, after providing for every liability, was £192,925 2s. 11d.
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All remittances must be made through our bankers, the Union Bank of Australia.

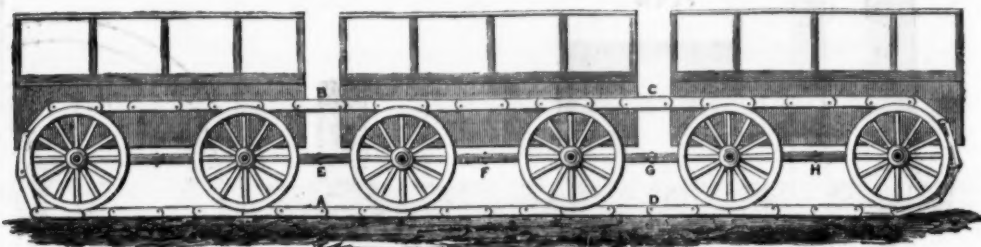
LAKE SUPERIOR, U.S.—Mr. G. W. HAMBLIN, Post Master, Negaunee Post-office, Marquette County, Lake Superior, U.S., has opened an office as above, for the purpose of supplying mineralogical specimens generally, but more particularly such as are peculiar to the district, to museums and collectors throughout the world. From his acquaintance with the different localities on the Lake, and with mining captains, he has facilities for collecting minerals, also for procuring the rarer sorts. Residing in the centre of the iron district, Mr. Hamblin can furnish specimens of ores of great beauty as cabinet specimens, of which the mammillary and stalactitic forms of hematite are worthy a place in any cabinet. He can also supply specimens of native copper and silver, with the accompanying minerals, many of which occur as crystals, forming rare objects of interest to the collector. Collections made up of all sizes and states of completeness, from the value of \$25 (or £5 sterling) to \$200. Letters of enquiry or conveying orders must be post paid.—P.S.—On receipt of £5 sterling Mr. Hamblin will forward a set of iron specimens; also, native copper and silver.
Crystals as follows will be supplied at from \$2 to \$4 each:—Quartz, calc spar (Dog Tooth and other varieties), epidote, greenstone, prehnite (with copper), black oxide copper, analcime, chlorastrolite (found only at Isle Royale), native copper (crystallised), calc spar (with radiated epidote), ripple marked quartz (from the metamorphic strata), and a large variety of others illustrative of the geology and mineralogy of this part of the world. On account of convenience of remittance, the smallest collection which can be forwarded will be \$25 (or £5 sterling).

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Offices, 42, Grey-street, Newcastle-upon-Tyne; 50, Howard-street, North Shields; 195, High-street, Sunderland.

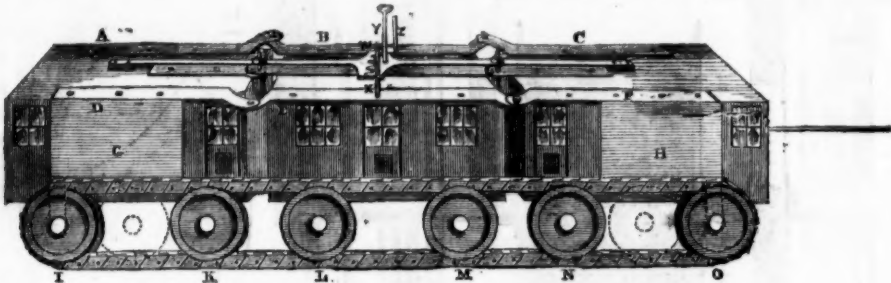
ENDLESS RAILWAY FOR COMMON ROADS.

By MR. LEWIS GOMPERTZ; AND HIS SUBSEQUENT IMPROVEMENTS.



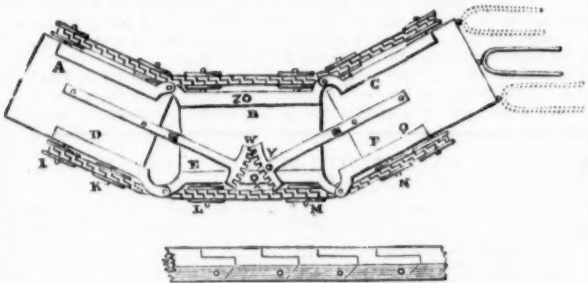
A long time ago I produced and published my endless railway train for common roads, which, though not equal to my square wheels with a conchoid curve, are more applicable to a train. It saves the friction and impediments of the road, the same as a common railroad does, and it is carried by the carriage itself, and laid down in an endless band of rails, which revolve around the wheels, while they proceed as smoothly on it as if on a fixed rail, thus saving great expense, delays (as to starting), and great

danger. A B is the chain of rails, the wheels being jointed to a bar at E, F, and G, so as to give horizontal flexure, and it can be moved by steam, by horses, or by men, the middle wheels being greatly favoured by not being incumbered by the chain being round them. The model of it worked very satisfactorily in a straight direction, but in turning corners, as the axles then diverge and contract, the chain was liable to be confined, or to come off. I have, therefore, constructed an improved model, which prevents these evils, and gives control to the driver to turn.



A B C in the plate annexed is the train, the carriages being jointed together in their middles endwise, so as to allow of turning, these joints being hidden in the drawing. From the centres of these joints is described the circular racks, W, one being attached to the front carriage and one to the back one, meeting by their teeth on the middle carriage, so that they guide each carriage to move alike in turning. I, K, L, M, and O are grooved wheels, embracing the endless chain, as in the former plan. Each of the external wheels, I and O (on each side), run on an axle which is fixed to a sliding frame on plates, G and H. When these plates slide they draw the wheels further from, or nearer to, each other, and they are jointed to the middle carriage, as shown by the set of two hinge bars, A B C, or D X F, on the top of the carriages, and the joints of their ends project so as to be exactly over the centres of the wheels. By the action of these joints on the sliding frames the external wheels, I and O, are always kept equidistant, and thus the chain is constantly kept at a proper tension, being prevented from slipping off the wheels, whether the train is curved to either side or is in a straight line.

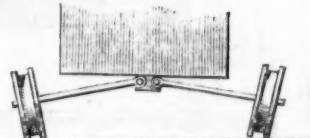
The turning of the train is performed thus—on one of the racks is an upright rod, Y, and on each side of this rod is affixed, on the middle carriage, a rod, X and Z, either of which is held by the driver with one hand, while the other hand grasps the middle rod, Y; and by pressing this from or to the external ones, X Z, the turning is done, because the rod, Y, proceeding from the external carriages, H and G, is moved one way, while the middle carriage is kept immovable. The operation can also be assisted by horses, steam, or a lever. This figure is a kite view of the carriages when turned, the same letters applying to the same parts.



The next figure is the side of the rails, which must bend freely three ways—inwards to inclose the wheels, and sideways (two ways) to allow of turning, but must be rigid outwards from the wheels, so as not to be much impeded by stones, &c. The ends of the rails must, therefore, be full in the middle, or inner crevice, and receding in the outside (not the reverse); thus they will be rigid, and come quietly to the ground, without the short corners striking it. Or the chain may, with advantage, be in three pieces (thus), as suggested by Mr. Cyrus Symons.

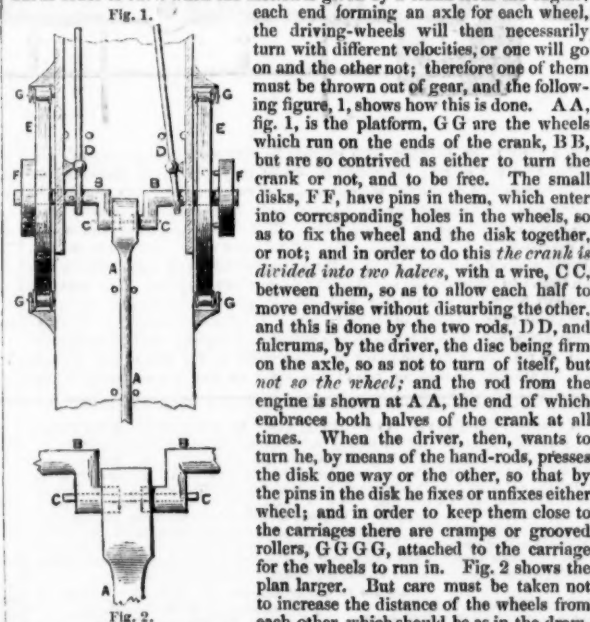
The following figure shows how to prevent the wheels from coming off

the rails, if the carriage be lifted up:—



The axle being movable on a joint, or by a slot, so that the weight of the wheels moved always keeps them down.

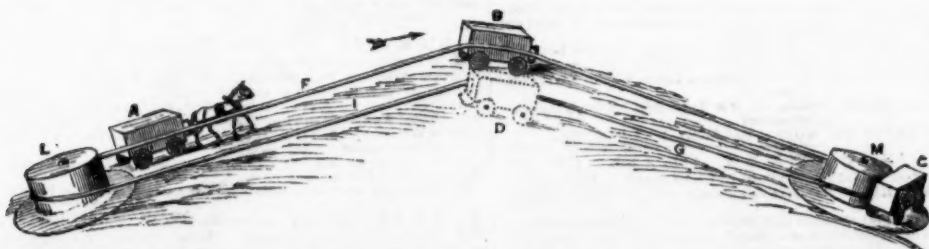
The main drawing of the new plan, in the above figures, shows three carriages for horse-power, but for steam the engine must occupy one of them; but in order to turn when the motion is given by a crank from the engine,



each end forming an axle for each wheel, the driving-wheels will then necessarily turn with different velocities, or one will go on and the other not; therefore one of them must be thrown out of gear, and the following figure, 1, shows how this is done. A A, fig. 1, is the platform, G G are the wheels which run on the ends of the crank, B B, but are so contrived as either to turn the crank or not, and to be free. The small disks, F F, have pins in them, which enter into corresponding holes in the wheels, so as to fix the wheel and the disk together, or not; and in order to do this the crank is divided into two halves, with a wire, C C, between them, so as to allow each half to move endwise without disturbing the other, and this is done by the two rods, D D, and fulcrums, by the driver, the disk being firm on the axle, so as not to turn of itself, but not so the wheel; and the rod from the engine is shown at A A, the end of which embraces both halves of the crank at all times. When the driver, then, wants to turn he, by means of the hand-rod, presses the disk one way or the other, so that by the pins in the disk he fixes or unfixes either wheel; and in order to keep them close to the carriages there are cramps or grooved rollers, G G G G, attached to the carriage for the wheels to run in. Fig. 2 shows the plan larger. But care must be taken not to increase the distance of the wheels from each other, which should be as in the drawing, as this would impede the turning. It might be advantageous on very rugged roads to let the ends of the chain be raised up a little, so as to form an inclined plane on obstacles. This could be done by having an additional wheel a little smaller than the other wheels, or by placing a wheel a little higher (though the former is best) within the rail-train. The rail might also be varied so as to turn nearly horizontally, instead of perpendicularly, by means of a nearly horizontal wheel at each end, and so that the wheels run on the flat of the rails; but I do not recommend it.

PLAN TO ASSIST CARRIAGES UP AND DOWN HILL.

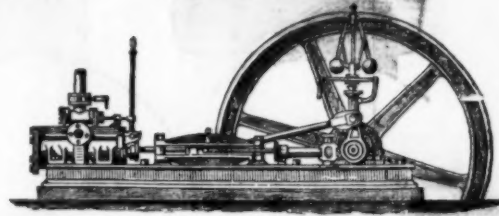
By MR. LEWIS GOMPERTZ.



I have here to propose an adaptation of an old and ingenious invention used in mining districts to draw up the inclines the empty wagons by means of the impetus of the loaded descending ones and a band revolving around a pulley-wheel at one end, so that one part of the band ascends while the other descends, the wagons being fastened by a tie under them, the loaded wagon being on the one side and the empty one on the other, so that the loaded wagon draws up the empty one; but no more empty ones can be so treated till another loaded one has to go down. But my plan is an adaptation of it for general use to assist carriages up and down hills, such as those of Highgate or Hampstead. F G is an endless band revolving around two large horizontal pulley wheels, L and C, affixed in the roads, and is attached to the wagons. B is at the top of the hill, and L and G are the level ends; B is a wagon always stationed at the top of the hill, loaded or to be loaded with weights by a person kept for that purpose, so as to equal the weight of the carriage about to ascend, as from A to B, and then a slight pull of the horse will draw it up to the place of B, while the carriage, B, descends to the end, C; and as the carriage, B, thus de-

scends to the end, C, the loaded carriage, C, will be drawn up by the carriage it had assisted, there to remain (but at the other side) to draw up another carriage, so that each assists each (shown dotted at D). The same band, &c., will do for carriages in either direction. Double friction will I am aware result, but a tramroad would relieve it. In the annexed plate, L and M are the two rollers on which the band revolves, these rollers having a large flange at the bottom; not so as to turn alone, but turning with the rollers in one body. B is the empty wagon, stationary at the top of the hill to be loaded for traction towards M. The wagon, B, then comes on the flange of the roller, M, and is carried round by it (as shown), and the carriage, C, passes on to D as the band proceeds (shown dotted), so that B, C, and D represent the same wagon. When the carriage, A, comes to the top, it will appear at B, and then descend to M, and by its own weight will draw up the wagon, C, to D, and then will have to be released from the band. But though four wagons are shown, there are, in fact, only two, A and B (the wagon and the carriage), the wagon will then stop at D on the other side for another traction.

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